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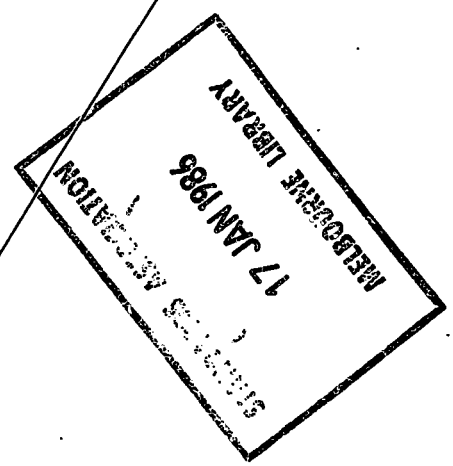
ROTATING ELECTRICAL MACHINES—GENERAL REQUIREMENTS
Part 31—SERVICE AND OPERATING CONDITIONS



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PREFACE

This edition of this standard was prepared by the Association's Committee on Rotating Electrical Machinery. It supersedes AS 1359, General Requirements for Rotating Electrical Machines, Part 31—1974, Service and Operating Conditions, and incorporates the following:

(a) IEC document 2(Central Office)511, March 1985, Amendment to Sub-clause 12.3 of Publication 34-1, Rotating Electrical Machines, Part 1—Rating and Performance, dealing with voltage and frequency variations. (See Clause 31.5 herein.)

(b) IEC document 2(Central Office)507, March 1985, Report on the Effects of Unbalanced Voltages on the Performance of 3-phase Cage Induction Motors. (See Appendix 31B herein.)

The main title of this standard has been rearranged slightly; this change is being progressively introduced to all standards in the AS 1359 series.

Review of Australian Standards. To keep abreast of progress in industry, Australian standards are subject to periodic review and are kept up-to-date by the issue of amendments or new editions as necessary. It is important therefore that standards users ensure that they are in possession of the latest edition, and any amendments thereto.

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Suggestions for improvements to Australian standards, addressed to the head office of the Association, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian standard should be made without delay in order that the matter may be investigated and appropriate action taken.

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FOR THE HISTORY OF AS. 1359.XX BEFORE 1974 SEE THE DRAFT 3RD GENERAL INTRODUCTION.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

ROTATING ELECTRICAL MACHINES—GENERAL REQUIREMENTS

PART 31—SERVICE AND OPERATING CONDITIONS

31.1 SCOPE. This standard specifies the general service and operating conditions for which rotating electrical machines excluding induction generators are suitable.

31.2 REFERENCED DOCUMENTS. A list with titles of the standards referred to in this standard is given in the Annex.

31.3 SERVICE CONDITIONS. Unless otherwise specified, a machine shall be capable of operation under the following site conditions:

(a) *Altitude above sea level*—not exceeding 1000 m.
NOTE: For a machine tested below 1000 m and intended for operation at an altitude between 1000 m and 4000 m, adjustments to allowable test temperature rises are specified in AS 1359.32.

(b) *Temperature of gaseous coolant*—not exceeding 40 °C.
NOTE: For a machine intended for service with a maximum temperature of gaseous coolant other than 40 °C, see AS 1359.32.

(c) *Temperature of liquid coolant*—not exceeding 30 °C at the inlet to the heat exchanger.

31.4 ELECTRICAL CONDITIONS. Standard electrical machine conditions shall be as follows:

(a) Three-phase 50 Hz.

(b) Voltage as specified in AS 1359.30.

Machines of other types, e.g. single-phase or d.c. machines, or of other voltages shall be considered as complying with this standard where they comply in all other respects.

31.5 POWER SUPPLY VARIATIONS DURING OPERATION. For a.c. machines, combinations of voltage variations and frequency variations are classified as being either Zone A or Zone B in accordance with Fig. 31.1 for generators and Fig. 31.2 for motors.

For d.c. machines, Zone A extends from 0.95 to 1.05 p.u. rated voltage; Zone B extends to 0.92 and 1.08 p.u. rated voltage (for generators), and to 0.90 and 1.10 p.u. rated voltage (for motors).

A machine shall be capable of performing its primary function continuously within Zone A but need not comply fully with performance standards applicable at its rating point.

A machine shall be capable of performing its primary function within Zone B, but may exhibit greater deviation from rated performance. In particular, temperature rises may increase. Extended operation at the perimeter of Zone B is not recommended.

For the purposes of this Clause, the primary function of a machine shall be to provide the following:

(a) An a.c. generator	rated apparent power (kV.A), at rated power factor where this is separately controllable.
(b) An a.c. motor	rated torque (N.m).
(c) A synchronous motor..	rated torque (N.m), the excitation maintaining either rated exciting current or rated power factor.
(d) A synchronous condenser	rated apparent power (kV.A) within the Zones applicable to a generator (see Fig. 31.1), unless otherwise agreed between manufacturer and purchaser.
(e) An a.c. machine with turbine-type rotor and rated apparent power of 10 MV.A and above ...	see IEC 34-3.
(f) A d.c. generator.....	rated power (kW).
(g) A d.c. motor.....	rated torque (N.m), the excitation of a shunt-wound motor maintaining rated speed.

Where a machine has more than one rated voltage or a rated voltage range, the temperature rise limits specified in AS 1359.32 shall apply to each rated voltage.

NOTES:

1. A machine will sometimes be required to operate outside the perimeter of Zone B. Such excursions should be limited in value, duration, and frequency of occurrence. Where practical, corrective measures should be taken within a reasonable time, e.g. a reduction in output. Such action may avoid a reduction in machine life from temperature effects.
2. The temperature-rise limits in accordance with AS 1359.32 apply at the rating point and may be progressively exceeded as the operating point moves away from the rating point. Operation on the perimeter of Zone A may involve a temperature increase of approximately 10 °C.
3. An a.c. motor will start at the lower limit of voltage only if its starting torque is adequately matched to the counter-torque of the load, but this is not a requirement of this Clause. For starting performance of certain three-phase cage induction motors, see AS 1359.41.

31.6 OPERATION OF A.C. MOTORS ON VIRTUALLY SINUSOIDAL AND VIRTUALLY BALANCED VOLTAGES.

31.6.1 Single-phase a.c. motors. Unless otherwise agreed between the purchaser and the manufacturer, a single-phase a.c. motor shall be capable of operation on a virtually sinusoidal voltage where the instantaneous value may differ by up to 5 percent of the instantaneous value of the fundamental component.

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